American Museum of Natural History

Center for Biodiversity and Conservation

Progress Report Spring 2023

Photo: Le Khac Quyet

In Memoriam:
Eleanor J. Sterling (1960–2023)

"...What was most unique however, was that Eleanor matched her passion, drive, and brilliance with equal doses of integrity and generosity. It is a rare combination and because of this, all of us who shared time with her have been changed for the better... She will continue to inspire us, always."

Ana Luz Porzecanski
CBC, AMNH

"...Eleanor was that kind of truly rare person who gave us some reason to hope for a better environmental future. We miss her."

Michael Novacek
AMNH

"...[Eleanor] was so courageous in working to fight for what she believed was fair and equitable, which often meant changing norms, weaving multiple worldviews and ways of knowing, and elevating the voices of Indigenous Peoples and Local Communities. She is greatly missed."

Rachel Dacks
University of Hawai'i

"Eleanor was a conservation leader of remarkable vision who never ceased to challenge her own perceptions and beliefs to forge more effective and just practices in conservation, while pulling all those around her into similar efforts... My faith in what we might achieve as a collective was always heightened through her guidance and spirit... I am so grateful for all the many lessons she shared."

Martha Groom
University of Washington

Photo: Denis Finnin/ © AMNH

The Year in Numbers

19 Publications

- 12 Peer-reviewed
- 17 Open access
- 9 With local partners
- 4 With students, interns, mentees

3 Awards, honors, or appointments

8 Presentations at professional meetings

14 Invited talks

11 Contributions to AMNH programs

9 Popular articles, media appearances or coverage

4 Funding proposals

27 Average number of interns, mentees, and trainees per semester

4 New software tools, modules and other resources produced (all open access)

News, Awards, and Appointments

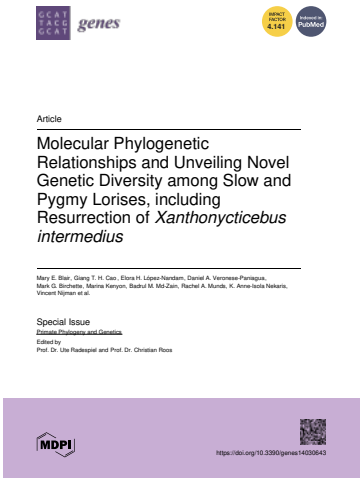
On Feb 6, 2023, at the Fifth International Marine Protected Areas Congress in Vancouver, Dr. Sterling was awarded the prestigious **Fred M. Packard International Parks Merit Award** by the International Union for the Conservation of Nature (IUCN) and the IUCN World Commission of Protected Areas (WCPA). The nomination was assembled by her colleagues at the CBC and the WCPA in recognition of more than 30 years of advancing just and effective conservation, and for her extraordinary contributions to conservation in and around protected areas around the world. Dr. Sterling was honored to receive this award, and was able to listen to the awards ceremony via Zoom.

Dr. Rachel Dacks (Assistant Researcher, Hawai'i Institute of Marine Biology, University of Hawai'i at Mānoa) accepting the Fred M. Packard International Parks Merit Award on Dr. Sterling's behalf.

The CBC will be collaborating with New York City Parks and Princeton University's High Meadow Environmental Institute on a pilot project investigating the social and ecological aspects of the harvest, consumption, and trade of **aquatic biodiversity in New York City.** Two Princeton University undergraduate interns were selected through a competitive process and will begin their work with the project team this summer.

The work of the Center for Biodiversity and Conservation brings strong evidence from multiple sources of knowledge and perspectives to bear on complex conservation problems and to foster collaboration on robust and equitable solutions. Below are selected updates on our work from the last few months.

Our research provides tools and evidence to support biodiversity in a changing planet.


genes

Article

Molecular Phylogenetic Relationships and Unveiling Novel Genetic Diversity among Slow and Pygmy Lorises, including Resurrection of *Xanthonycticebus intermedius*

Mary E. Blair, Giang T. H. Cao, Elora H. López-Nandam, Daniel A. Veronese-Paniagua, Mark G. Birchette, Marina Kenyon, Badrul M. Md-Zain, Rachel A. Munds, K. Anne-Isola Nekaris, Vincent Nijman et al.

Special Issue
Primate Phylogeny and Genetics
Edited by
Prof. Dr. Ute Radespiel and Prof. Dr. Christian Roos

MDPI

https://doi.org/10.3390/genes14030643

Figure 7. Photos depicting the longer muzzle in the southern pygmy loris: (**a**) Lam Dong Province, Vietnam in 2015, Photo by H. Thach; (**b**) Bu Gia Map National Park, Binh Phuoc Province, Vietnam in 2014, Photo by Kieu Dinh Thiệp); and a shorter muzzle in the northern pygmy loris: (**c**) Tuyen Quang Province, Vietnam in 2013, Photo by H. Thach; (**d**) EPRC, Cuc Phuong National Park, Vietnam in 2014, Courtesy of T. Nadler, Photo by M. Blair) also showing the full range seasonal pelage change in the pygmy loris: (**c**) summer coloring; (**d**) winter coloring.

Dr. Mary Blair (Rizavi Innovation in Conservation Fellow; Director of Biodiversity Informatics Research, CBC) and collaborators described **a new, endangered species of pygmy loris**, based on data from museum specimens. The results were published in the journal *Genes* in March. The study received ample media attention—including from *Scientific American*—as describing a new primate species happens very rarely. With funding from the National Science Foundation (NSF), Dr. Blair, along with Dr. Sterling, Minh Duc Le (Research Associate, Herpetology), and collaborators, used scientific collections from across the United States, as well as in Vietnam and France, to investigate diversity among lorises. The study included DNA from slow loris and pygmy loris specimens collected between 1884 and 1980. They combined these data with genetic samples collected during Dr. Blair's conservation field surveys in Vietnam and physical measurements of skulls from the Museum specimens, eventually finding two genetically distinct groups within the pygmy lorises that also have differences in skull and mandible size.

The DNA evidence suggests these groups diverged from one another more than one million years ago and occupy different geographic areas, with the new species representing pygmy lorises from northern Vietnam, Laos, and China, and the southern group including pygmy lorises from southern Vietnam and Cambodia. The research is already being applied by rescue centers in Vietnam to its rescue-and-release protocols for these threatened nocturnal primates, and was submitted to the Vietnam Red Data Book and approved/listed as endangered. Dr. Blair is advising the Association of Zoos and Aquariums and European Association of Zoos and Aquariaeon global captive management implications.

Dr. Blair's work is also enhancing our understanding and protection of other endangered primates. Using methods developed by Dr. Blair, CBC trainees and partners in Vietnam published climate change projections for the critically endangered Delacour's langur and for the northern white-cheeked gibbon.

In Colombia, Dr. Blair continues her NASA-funded work advancing the open-source species distribution modeling (SDM) software *Wallace* as a conservation tool. Dr. Blair recently co-led a workshop at the VI Colombian Zoological Congress. The workshop convened taxonomic experts on armadillos, otters, anteaters, and tapirs in Colombia to curate occurrence records and create collaborative, expert-informed distribution models (using CBC-developed tools) for these species to update the Atlas of Biodiversity of Colombia and to inform analyses of species diversity and richness for protected area planning. More than 30 experts participated in the workshop representing a dozen Colombian Universities and conservation organizations. Dr. Blair was also the Invited Keynote Speaker to the IV Colombian Symposium on Distribution Modeling at the Congress, where she presented on *Wallace*. As an outcome of the symposium, a network for species distribution modeling in Colombia will be established following the example of the CBC-led NY-SDM discussion group to hold talks, offer trainings, and develop tools to advance the use of species distribution modeling approaches in Colombia.

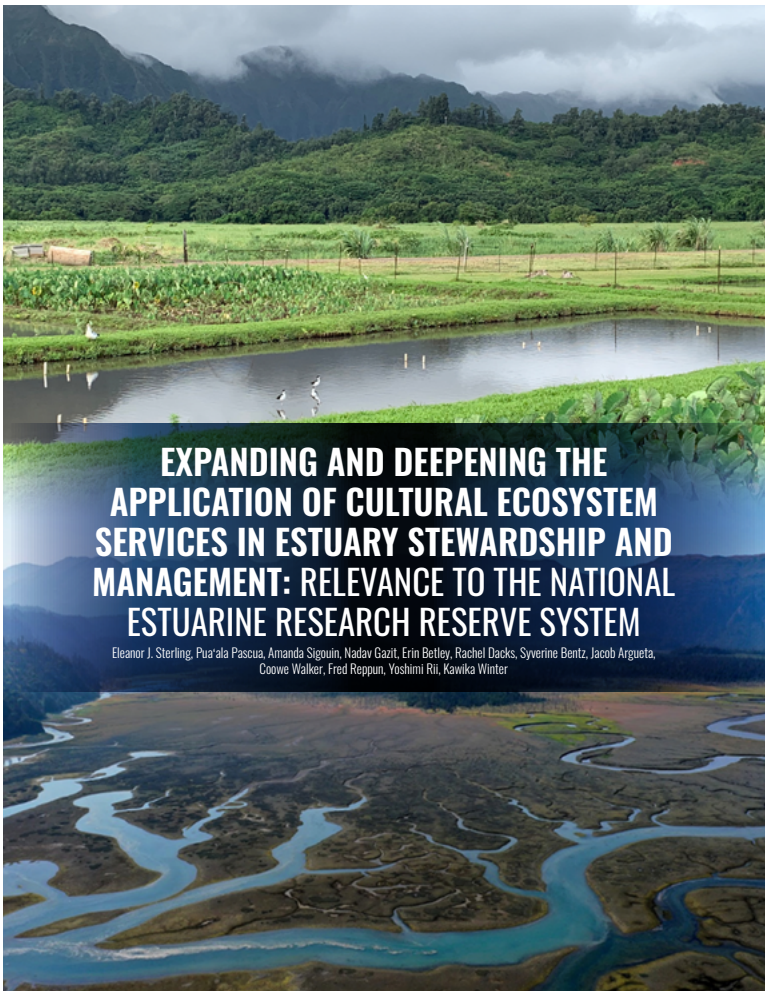
Finally, through her participation in the Study of Environmental Arctic Change (SEARCH), an NSF-funded initiative, Dr. Blair contributed to the 2022 NOAA Arctic Report Card, an authoritative report that summarizes the current state of the Arctic environmental system. Dr. Blair was a co-author on the chapter of the Report Card that described the consequences of rapid environmental arctic change for human well-being, combining Indigenous knowledge alongside other scientific observations and models to convey the importance of urgent action. This project seeks to synthesize knowledge on the causes and consequences of environmental change in the Arctic, especially for aspects of human well-being such as safety, food security, coastal erosion, and community resilience, and share that understanding with diverse decision-makers. Important to Dr. Blair's participation is her identity as a descendant of Indigenous reindeer-herding Sámi from Guovdageaidnu (Kautokeino), Norway. Dr. Blair has many family members who still herd today on traditional Sápmi lands, and can bring their perspectives to bear on the project, with human well-being in mind. In April, Dr. Blair met with several of her Sámi relatives and colleagues during the United Nations Permanent Forum on Indigenous Issues. Along with Dr. Ana Porzecanski (Director, CBC), they participated in sessions on the new Global Biodiversity Framework and how it can be implemented in collaboration with Indigenous peoples.

This spring, Dr. Suzanne Macey (Network of Conservation Educators and Practitioners (NCEP) Manager; Biodiversity Scientist, CBC) is starting the fifth year of her turtle ecology research program at Black Rock Forest (BRF), in Cornwall, New York. Dr. Macey is leading a team—including faculty and students from Columbia University and Barnard College and external consultants from the Wildlife Movement Institute and Hise Scientific—to improve the understanding of movement and habitat use of turtle species. The research team recently received a David Redden Conservation Science Research Grant to design a protocol and integrate a new low-cost GPS tracking system with BRF's wireless mesh network. This system will allow researchers to remotely monitor the movements of small animals such as turtles within the forest. The larger aim is to widely distribute the technical innovations and lessons learned so other small-scale research and education projects can implement similar systems. Additionally, this year the team will closely track a small population of spotted turtles (*Clemmys guttata*), which is under consideration for federal protection under the Endangered Species Act. Data collected on this population is timely as the wetland they inhabit is being altered by the draining of a reservoir dam and understanding how these animals use the area may inform critical conservation management decisions.

The CBC's Associate Director, Dr. Felicity Arengo, retired in April. In her last season at the CBC, Dr. Arengo and colleagues in Argentina conducted an expedition to the Andean wetlands of northwestern Argentina in an ongoing effort to monitor flamingo and other waterbird populations and track wetland conservation status. The team found an active flamingo nesting colony at Laguna Grande in the LAPCat Ramsar site. They also found that lithium mining activity has increased significantly at Salar del Hombre Muerto, with eight active mining projects that are projected to increase lithium production by an order of magnitude (from 16,000t/yr to 160,000t/yr).

Lithium mining requires pumping brine from the groundwater and using large quantities of freshwater for processing and supplying mining camps, yet water is expected to become more scarce in the region due to climate change. Dr. Arengo and colleagues published a localized study providing evidence for a decrease in the extent of these sensitive wetland habitats over time, related to recent climate trends, and in alignment with regional model predictions. Our existing understanding of wetland hydrology is insufficient to measure the impact of mining activity on the functioning of wetlands, so current efforts focus instead on measuring direct loss of habitat to the mining footprint. Local Atacameño communities have submitted a legal request to halt mining because of violations in the free and informed consent process, and due to insufficient information on the environmental impacts. The field research team has provided expertise to these communities, and also met with agencies, communities, NGOs, and project lenders to share information and emphasize the need to understand wetland hydrology, consider cumulative and synergistic impacts, and take a systems approach to evaluating socio-environmental impacts.

The CBC continues to advance biocultural approaches to conservation through key research-informed resources for practitioners and decision-makers. As part of the past project "Cultural Ecosystem Services in Estuary Stewardship and Management," which was a collaboration with former CBC Biodiversity Scientist Pua'ala Pascua funded through the National Estuarine Research Reserve (NERRS) Science Collaborative Program, the CBC published a capstone report that reviews conceptual foundations, diverse and innovative assessment methods, and case studies that illuminate the advantages of including cultural benefits in ecosystem service assessments. The report concludes with a series of actionable recommendations to NERRS staff (and any other organizations making decisions that relate to the linkages between people and their environment in marine and coastal ecosystems) for assessing cultural ecosystem services, enhanced with quotes from numerous project participant perspectives, from research and education to Indigenous viewpoints. The project engaged the CBC, the He'eia National Estuarine Research Reserve (Hawai'i), and the Kachemak Bay National Estuarine Research Reserve (Alaska) in place-based explorations of cultural ecosystem services and supports opportunities for meaningful exchange with Indigenous and local community partners near both reserves. Additional guides and resources are available on the project website, including short introductory materials on cultural ecosystem services and a compilation of useful case studies.




Reserve exchange participants joined He'eia Reserve community partner Kākoʻo ʻŌiwi in service learning and practiced participant observation/participatory action research while removing an invasive plant species from the coastal wetland. *Photo credit: He'eia Reserve.*

also asked to note (a) what they photographed and (b) the impact to their health/well-being. The photos were then used to guide discussion in focus groups. The notes about the photos and the focus group discussion transcripts were coded and resulted in four high-level themes. See O'Brien et al. (2014).

Visioning/Future Scenarios at Lofoten Islands, Norway: The goal of this study was to understand the links between ecosystem services and human well-being in a coastal fishing community. In workshops, participants were directed to identify natural and social drivers of "the good life," in order to develop 3–4 future scenarios. Participants also developed conceptual maps of these scenarios to explore their causes and impacts. The scenarios were used to guide discussion and were also the focus of follow-up interviews. The researchers used qualitative analysis to distill their findings into four distinct narratives that describe how ecosystem services contribute to "the good life." See Kaltenborn et al. (2017).

MULTIMETHOD PILOT IN THE NERRS

In April 2022, He'eia NERR and Kachemak Bay NERR gathered in He'eia to pilot five distinct CES assessment methods with staff from each reserve—Transect Walks, Structured Surveys, Participant Observation, Creative Writing, and Photography—and to evaluate each method's strengths, weaknesses, and applicability within each reserve. Each of the methods was found to be useful for different purposes and audiences within different sectors of the reserves. The group also evaluated the time, resource, and skills required for each method. Further details

CONSIDER WHAT YOUR INDICATOR IS ACTUALLY MEASURING

The types of metrics or indicators used to measure CES can vary considerably (see Table 3), depending on the amount of time and other resources available. Some initiatives only measure performance indicators that are simple to gather and summarize, such as how many people attended a meeting. But there is a critical distinction between measuring the opportunity to support thriving human communities (for instance, measuring numbers of visitors to a protected area to demonstrate visitors' value of the site) and providing evidence of impact—the extent and depth of the change in benefit to well-being of an experience or an initiative. Practice- and meaning-based indicators would measure benefits or contributions to well-being—for example, measuring trends in people's

Local students use participatory creative media to describe their relationships to place in He'eia. *Photo credit: S. Rii.*

sense of place or assessing changes in values as a result of a particular experience. Measuring a suite of CES is an important first step; however, deepening the application of CES in resource management and stewardship may more closely align with assessing the impact of a CES on human well-being.

An Indigenous Perspective

"Indigenous worldviews do not perceive the dividing lines between humanity and nature that are foundational to the neoclassical worldview that dominates conventional thinking. We know that the health of our environment is our health. As long as the land is sick, so, too, will be our people. As we endeavor to heal our lands and our waters, we heal ourselves, our families, and our communities in the process. To address substance abuse in our community, we plant trees. We need ways to measure how the dots are connecting, not just how many dots we have. Doing so will help us to show the true value of our work.

In our assessment of CES methods, there were some clear gaps between what we have experienced in working with Indigenous Peoples and local communities (IPLCs) and the aspects of well-being that are measured in the realm of scholarly literature. For example, the gravitational pull towards focusing on economics has influenced terminology in the categories, such as use of the word livelihoods rather than lifeways—the latter being a term that is increasingly used in the realm of indigenous studies. While we did not come across a method for quantifying CES in terms of lifeways, that should not stop researchers from designing a new methodology to explore this within the context of CES, if that puts things in a framework that is more aligned with IPLC priorities in your area."

—Kawika Winter, Director, He'eia NERR

In the fall, Dr. Sterling, CBC Biodiversity Scientist Erin Betley, and CBC Biodiversity Specialist Amanda Sigouin co-authored a synthesis paper on how to measure and assess human well-being with consideration of both equity and the environment. This publication was part of a special feature in the journal *People and Nature* titled: "Lost in transition? Capturing the impacts of conservation and development interventions on relational values and human wellbeing in the tropics."

We put relevant evidence into the hands of managers and policy-makers.

The CBC seeks to promote the use of evidence in environmental decision-making by contributing evidence to policy processes, and through new evidence reviews and research. We also work to improve practices of evidence synthesis through our ongoing work with the global Collaboration for Environmental Evidence as well as a working group on rapid evidence assessment methods and applications, led by the United States Environmental Protection Agency.

This past season, the CBC worked closely with the World Wildlife Fund (WWF) to review and synthesize evidence related to participatory monitoring and evaluation (PME). This approach to monitoring has been linked to better conservation outcomes when focused on issues that are meaningful to community members. The review aimed to distill insights around successes, challenges, and opportunities, to inform and support PME practices at WWF and other NGOs in the conservation field. The review included sources from both peer-reviewed and grey literature, as well as interviews with 30 experts at WWF and other organizations. We identified bright spots and challenges in three areas: collaboration processes, resources needed and generated by PME, and working within local and cultural contexts. We highlighted four opportunities to enable PME in conservation: reflecting on fundamental questions about how an organization wants to approach what PME is and for what purpose; strengthening capacity around—and access to—expertise in the social sciences and collaboration processes; sharing learning and key resources from PME work within organizations and more broadly; and diversifying and innovating how PME is supported, funded, and assessed. Results were shared with over 100 experts from the global WWF network in early April.

In March, the CBC submitted comments to inform the framing of the National Nature Assessment (NNA) in response to a general request from input from the United States Office of Science and Technology Policy (OSTP). The NNA will "assess the status, observed trends, and future projections of America's lands, waters, wildlife, biodiversity and ecosystems and the benefits they provide." Our comments addressed the importance of including multiple knowledge sources in the framing process and provided key resources that could help guide this process. Our response also highlighted cultural benefits as a significant benefit of nature and discusses ways these can be assessed while also providing relevant resources.

As part of our five-year collaboration with the Integrated Natural Resource Management (INRM) consortium, funded by the United States Agency for International Development (USAID), we are providing on-demand insight and expert advice for agency teams on evidence relevant to land and resource governance, natural resource management, climate change, and sustainable artisanal mining. During the past six months, the CBC has contributed to several key evidence-based projects, which illustrate the range of pressing questions of relevance for both conservation and international development:

How should USAID direct its investment in biodiversity programs moving forward?

Dr. Ana Porzecanski, Erin Betley, Amanda Sigouin, and Dr. Andres Gomez from DAI completed a well-received rapid scoping review of the evidence on biodiversity status, threats, and opportunities to inform the "refresh" of USAID's Biodiversity Policy, a document that determines how the agency's $300 million biodiversity budget will be invested. The review pointed to several key opportunities to align biodiversity programming and funding with climate change priorities. We presented our findings and recommendations to the USAID Biodiversity Division in February, during a two-day workshop, and it was very well-received. To quote the USAID activity manager: "Your presentation was referred back to throughout the workshop; in particular, people appreciated your emphasis on systems thinking and unpacking values —two themes that were returned to over and over."

What key evidence is needed to advance sustainable small-scale gold mining in Colombia, and how can it be generated?

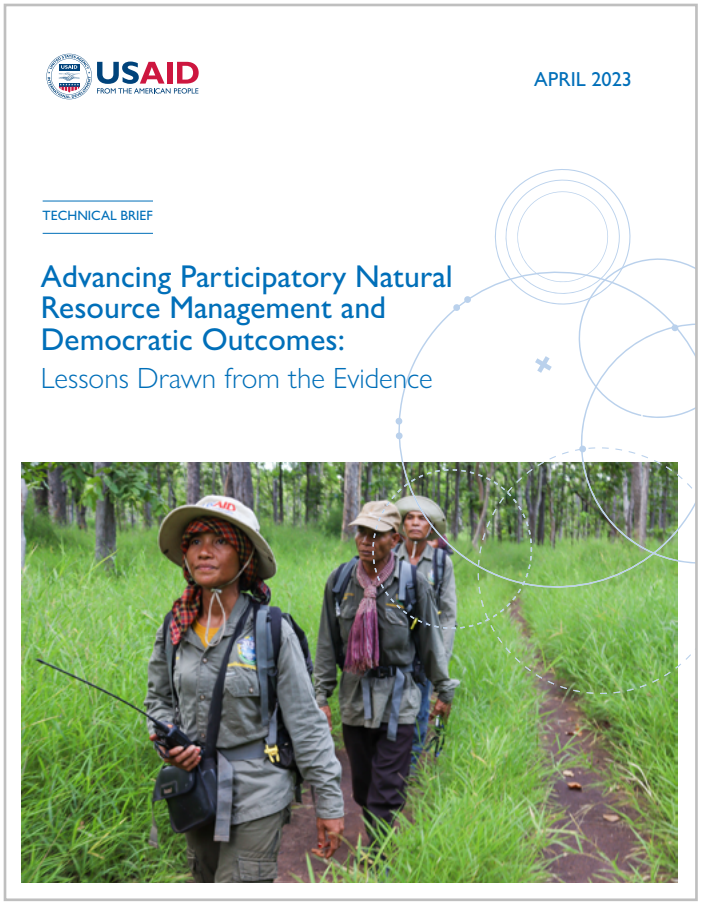
Dr. Porzecanski, Betley, and Dr. Samantha Cheng, CBC Visiting Scientist and Director of Conservation Evidence at WWF, completed a Research and Learning Agenda (RLA) on Artisanal and Small-Scale Gold Mining in Colombia as part of a broader year-long USAID initiative of called Mining Horizon. In late October, Dr. Porzecanski, Betley, and colleagues launched the RLA with presentations to USAID and the Government of Colombia, in English and Spanish.

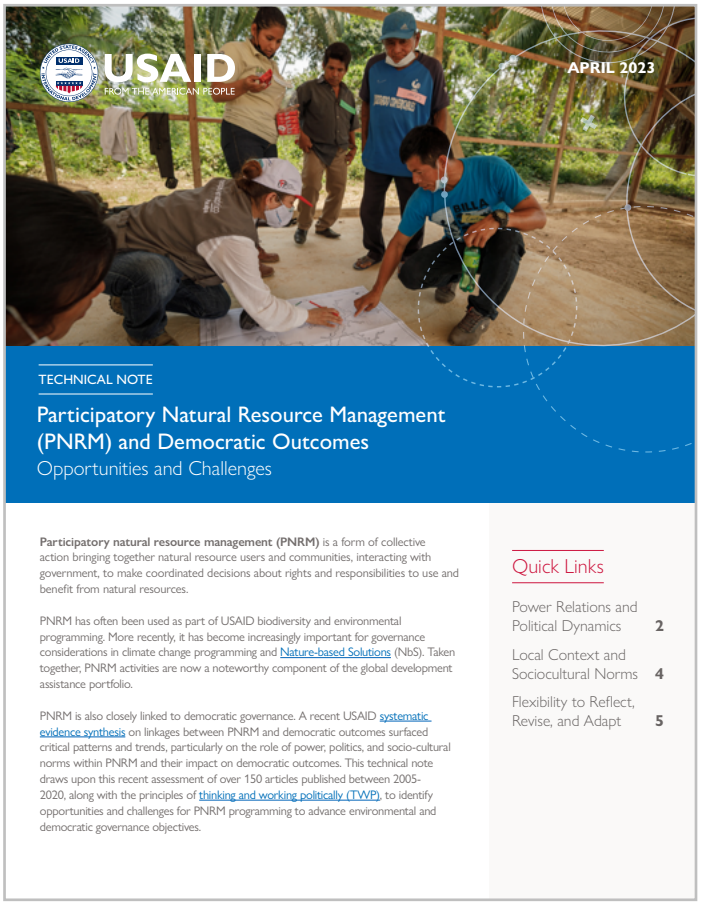
How can USAID support Missions and programs in the face of a changing climate?

Betley and Dr. Cheng are collaborating with others at INRM on a year-long evidence review related to climate resilient biodiversity programming. USAID Missions across the globe are experiencing climate change in different ways, influencing the kinds of support and climate information they need. Compounding this, different countries and regions also have different capacities and opportunities to harness reliable and up-to-date climate data and information. This scoping evidence review is collating relevant evidence from peer-reviewed literature, grey literature, and key informants on approaches and tools that integrate climate change information into programs implemented by donor, NGO, and other biodiversity-focused organizations.

Do participatory approaches to the management of natural resources generate broader democratic outcomes?

Betley, Dr. Cheng, and collaborators led a systematic evidence review to assess existing evidence from hundreds of peer-reviewed articles from the last 15 years on the links between participatory natural resource management (PNRM) in environmental programming and key aspects of democracy such as representation, advocacy, rights, justice, conflict resolution, and gender equality. Results were published in May 2022, and two derivative products are nearing publication. As an example of the impact of this publication, the World Bank is exploring using it for their work in developing indicators for measuring conflict sensitivity of natural resource management-based interventions.





How can USAID measure progress towards its climate strategy targets?

Betley is also part of an INRM team supporting USAID as it develops ways to measure targets in the Agency's 2022-2030 Climate Strategy, particularly with respect to two targets on systemic change. Through these targets USAID aims to align its development portfolios with systemic changes that contribute to climate commitments while increasing meaningful participation of Indigenous Peoples, local communities, women, youth, and other marginalized and/or underrepresented groups in at least 40 partner countries.

We are creating resources and spaces to train and empower conservationists everywhere.

Our software tools are used daily to support the analysis of biodiversity data and have been cited in hundreds of peer-reviewed articles and government reports.

This past season, the CBC released a new version of *Wallace* software, which included major re-engineering and advancements. These include dramatic streamlining of the process for adding new modules as well as standardized metadata reporting. We also made a major update to Maxent, making it much faster (hours instead of days) to process thousands of models at a time. This will be critical for people doing community and global analyses. The original 2006 publication for Maxent has been cited over 17,000 times, and the latest version from 2017 has been cited 1,600 times. Maxent has been used in many recent high-profile applications ranging from an analysis of the global distribution of known and undiscovered ant biodiversity to a study of conservation issues for the Saker Falcon in Mongolia. Maxent also continues to be widely used for conservation in Colombia where, most recently, it contributed to designing conservation corridors for birds in new conservation areas. This study, by Daniela Linero, GIS and Data Analytics Specialist for Audubon Americas, was the top prize winner for the professional talk category at the recent Colombian Zoological Congress. (Photo uploaded to Teams of Daniela).

Photo: Dick Daniels

Photo: Sue Thompson

An additional CBC tool, the Geographic Distance Matrix Generator (GDMG)—A Java application that computes distances based on geographic coordinates—has been widely used over the years in climate change related studies. The most prevalent use of the GDMG has been to explore genetic diversity by distance in relation to changing or future climate scenarios. For example, together with Maxent, it was recently used to project the potential effects of climate and human influence changes on nice plant species and implications for nature's contribution to people in Kenya, as well as climatic effects on gene diversity in the greater horseshoe bat in China.

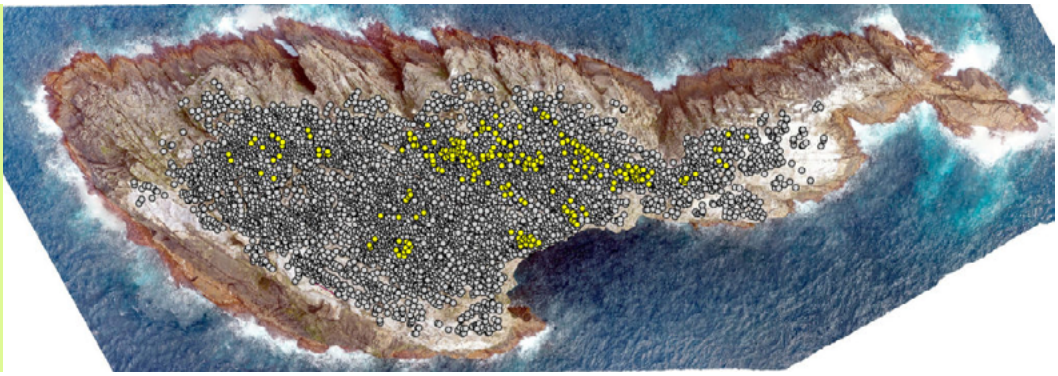
A new version of our DotDotGoose software application was also released with an exciting new feature: translations into Chinese, French, Spanish, and Vietnamese. DotDotGoose continues to be used to count and monitor diverse targets including a long-term study of the marine ecology, breeding biology, and population dynamics of the world's least known, most enigmatic penguin species: New Zealand's crested penguins, also known as Tawaki.

To learn more about the team leading this study, visit their website here.

Klemens diligently adding coloured dots to Bounty Island drone-imagery to count penguins, albatross, seals and more.

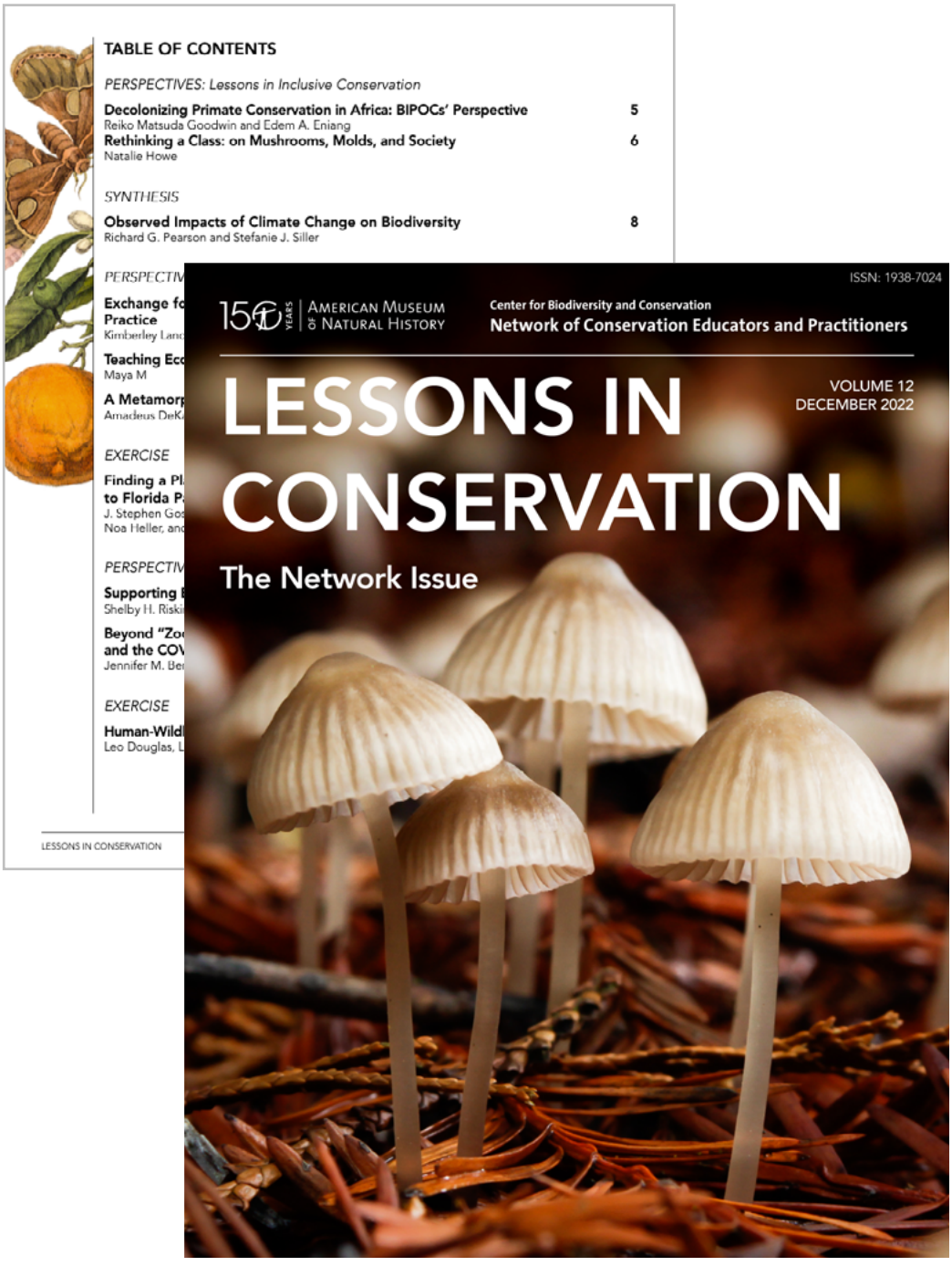
The penguin colony at Reef Point, a mere 100 m from the hut, but still a 30 minute scramble through tussock away.

The Molly Cap orthomosaic with albatross (grey) and penguin (yellow) dots



In everything we do, we continue to prioritize open education and resources and the creation of inclusive environments so citizens, students, and all professionals can pursue their careers and engage in contributing solutions.

NCEP has published a new issue of our online journal, *Lessons in Conservation: the Network Issue*. This issue features a collection of materials developed by NCEP Studio participants, including case studies on the impacts of climate change on biodiversity and exercises engaging with issues of human-wildlife coexistence through mapping and stakeholder role-play. This issue also introduces a new feature: perspective pieces written by Studio alumni on topics from equity in the classroom and the field to challenges and possibilities with remote learning. These perspectives provide thoughtful and thought-provoking vignettes from our Network.



In December, NCEP also published a new case study-based exercise, "Finding A Place For Panthers," on the topic of wildlife relocation. Restoring wildlife populations requires locating, protecting, and connecting areas where species can thrive under both ecological and anthropological conditions. Addressing these spatial needs may be difficult, as required habitats may have been lost, fragmented, or altered prior to restoration. In this exercise, students consider these issues in a case study of Florida panthers (*Puma concolor coryi*), a currently federally protected carnivore that has a growing population in Florida. Students will use Google Earth to view, manipulate, and create maps related to the growth of panther populations and related habitat needs and human interactions from the early 1990s to 2021. Students will consider various ways stakeholders may work together and be engaged to provide panthers with increased protection and expanded ranges, including land acquisition, conservation easements and banking, and wildlife corridors.

Finding a Place for Panthers: Mapping Conservation Issues Related to Florida Panthers

Exercise

J. Stephen Gosnell[i,ii], David P. Green[iii], Laila Akallal[i], Chelsea Wepy[i], Gregory Laghiti[i], Muspika Akter[i], Noa Heller[i], and Nihal Ozgur[i]

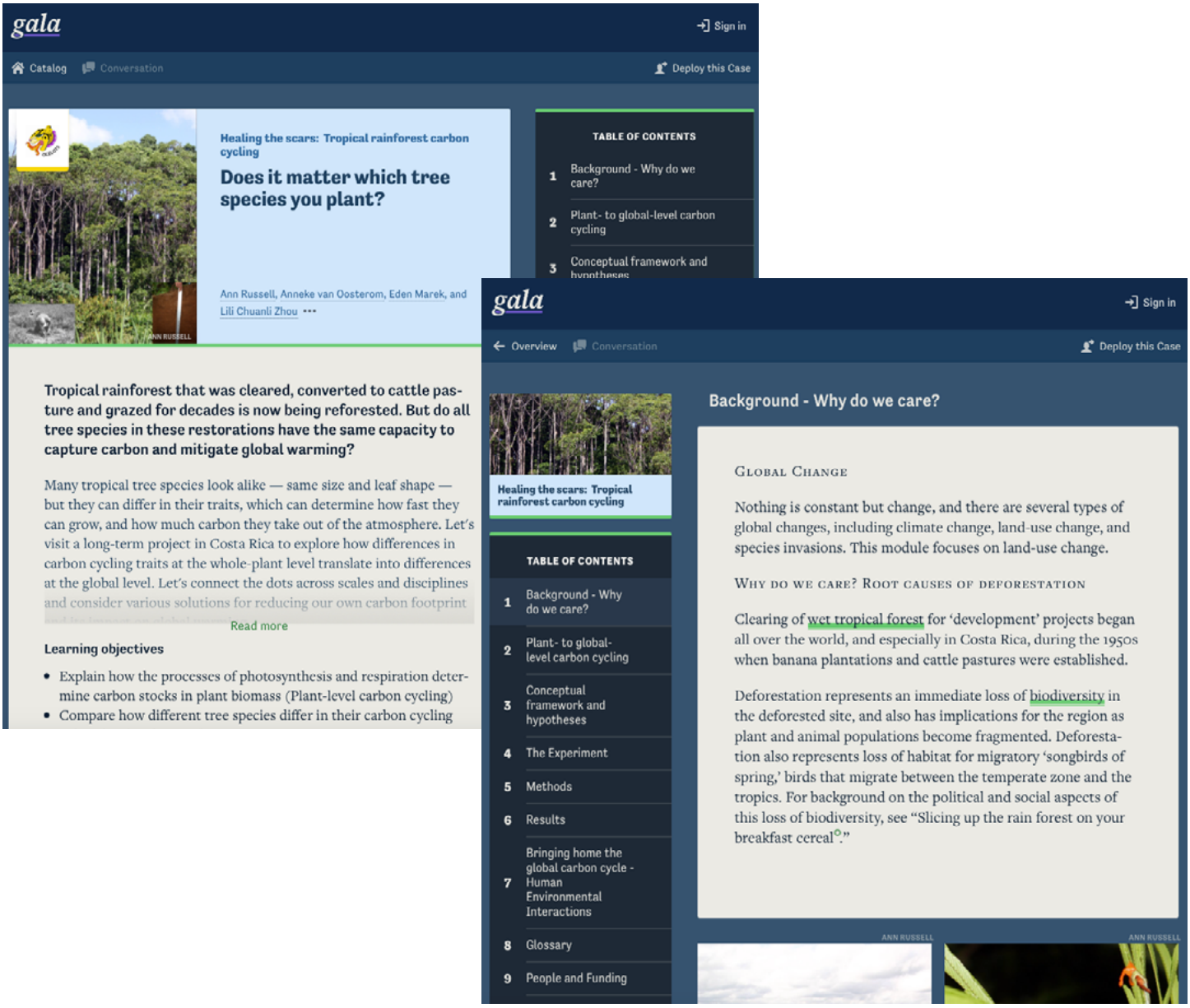
A roadside traffic sign on Daniels Boulevard in Fort Myers, Florida, USA warning drivers to keep alert for any panthers that may be crossing the road. Photo and caption by Barbara (WVS) via Wikimedia Commons (CC BY-SA 4.0).

Abstract

Restoring wildlife populations requires locating, protecting, and connecting areas where species can thrive under both ecological and anthropological conditions. Addressing these spatial needs may be difficult, as required habitats may have been lost, fragmented, or altered prior to restoration. Changes in land use may also lead to increased human-animal interactions that impact restoration outcomes. In this exercise, students consider these issues in a case study of Florida panthers (*Puma concolor coryi*), a currently federally protected carnivore that has a growing population in the state of Florida, USA. Students will use Google Earth to view, manipulate, and create maps related to the growth of panther populations and related habitat needs and human interactions from the early 1990s to 2021. In doing so they will explore how stakeholders interact with each other and with panthers regarding both their hopes for species restoration and the areas they represent or occupy. Students will also consider various ways stakeholders may be engaged to provide panthers with increased protection and expanded ranges, including land acquisition, conservation easements and banking, and wildlife corridors.

[i] Department of Natural Sciences, Baruch College CUNY, New York, NY, USA
[ii] The Graduate Center of the City University of New York, New York, NY, USA
[iii] National Center for Science and Civic Engagement, Washington, DC, USA

October 2022 marked the second year of the NSF-funded OCELOTS (Online Content for Experiential Learning of Tropical Systems) Research Coordination Network, co-led by Dr. Macey and collaborators at Iowa State University. OCELOTS brings together tropical ecology researchers, active learning pedagogy specialists, software developers, and media specialists to create an open-access online resource library of learning modules in tropical ecology. The first OCELOTS "Incubator" launched in September 2022, and 13 participants are working in teams to create a suite of new interactive online teaching modules, which will be presented to the larger OCELOTS network by May 2023 and then published on the Gala platform. Modules cover a wide range of topics, from selecting species for tropical forest restoration in Hawai'i, interpreting data from camera traps on wildlife crossing infrastructure in Costa Rica, to using remote sensing to improve carbon stock estimates in the Amazon. Additionally, starting in January 2023, OCELOTS launched a Faculty Mentoring Network (FMN) with 14 post-secondary educators from 10 different countries. Each FMN participant is using an existing OCELOTS module in their classroom this term and will report back on how they implemented the material and opportunities for improvement. These faculty will then publish their reports on the open-access education resource platform, QUBESHub, allowing other educators to learn from their peers on using these modules in real-classroom scenarios.



We are excited to be planning onsite activities for the 14th Student Conference in Conservation Science-New York, this fall! The Conference will again convene emerging conservationists at the Museum for three days with hybrid talks, workshops, and face-to-face mentoring, as well as onsite posters. We are also in discussions to broaden our roster of local and regional partners to deepen our impact within the New York City community, and will be brainstorming new ways to support students and early-career professionals in our own backyard in future conferences.

Our mentoring has lasting results, and there have been many notable accomplishments by former fellows and mentees. As two examples, former Helen Fellow Cecina Babich Morrow was awarded a Fulbright Fellowship to pursue a doctorate in Environmental Intelligence at the University of Bristol. Former Graduate Student Jen Tinsman is now a Forensic Mammologist for the United States Fish and Wildlife Service.

We are growing our outreach to reach diverse audiences. Catch us online or onsite!

This spring, the CBC partnered with the Museum's public programs team to present a conservation talk as part of Museum's popular SciCafe series. Dr. Rodrigo Medellín, senior professor of ecology at the National University of Mexico and a long-time CBC collaborator, shared the latest on innovative biodiversity conservation efforts that are changing the prospects for wildlife, from big cats to long-nosed bats. From tackling jaguar conservation by adjusting their dietary preferences, to working with agave farmers and mezcal consumers to bring us Bat-friendly mezcal, his work is improving conditions for multiple species. The tasting of bat-friendly mezcal was especially popular!

Photos: Matt Shanley/ © AMNH

Spring 2023 | Publications

Betley, E. Porzecanski, A.L., Cheng, S.H., Evans, D.M., & Gómez, A. (2022). Research and Learning Agenda for Artisanal and Small-Scale Gold Mining in Colombia. USAID. December 2022. Available from: https://www.land-links.org/wp-content/uploads/2023/01/Mining-Horizon-Research-and-Learning-Agenda-2022-12-508.pdf

Betley, E., Blair, M.E., Cullman, G. (2023). Eleanor Jane Sterling (1960-2023). Nature Ecology & Evolution. https://doi.org/10.1038/s41559-023-02054-4

Blair, M.E., Cao, G.T.H., López-Nandam, E.H., Veronese-Paniagua, D.A., Birchette, M.G., Kenyon, M., Md-Zain, B.M., Munds, R., Nekaris, K.A.I., Nijman, V., Roos, C., Thach, H.M., Sterling, E.J. & Le, M.D. (2023). Molecular phylogenetic relationships and unveiling novel genetic diversity among slow and pygmy lorises, including resurrection of *Xanthonycticebus intermedius*. Genes, 14(3), 643. https://doi.org/10.3390/genes14030643

Blair, M. E., Arengo, F., Bynum, N., Cullman, G., Douglas, L. R., Groom, M. J., Rivera, C. J., & **Porzecanski, A. L.** (2023). In memoriam: Eleanor Jane Sterling (1960–2023). Conservation Biology, e14099. https://doi.org/10.1111/cobi.14099

Cheng, S. H., Costedoat, S., **Sterling, E. J.,** Chamberlain, C. J., Jagadish, A., Lichtenthal, P., Nowakowski, A. J., Taylor, A., Tinsman, J., Canty, S. W. J., Holland, M. B., Jones, K. W., Mills, M., Morales-Hildago, D., Sprenkle-Hyppolite, S., Wiggins, M., Mascia, M. B., & Muñoz Brenes, C. L. (2022). What evidence exists on the links between natural climate solutions and climate change mitigation outcomes in subtropical and tropical terrestrial regions? A systematic map protocol. Environmental Evidence (2022) 11:15. 19 April 2022. https://doi.org/10.1186/s13750-022-00268-w

Kass, J., Pinilla-Buitrago, G., Paz, A., Johnson, B., Grisales-Betancur, V., Meenan, S., Attali, D., Broennimann, O., Galante, P., Maitner, B., Owens, H., Varela, S., Aiello-Lammens, M., Merow, C., **Blair, M.,** and Anderson, R.P. (2023). *Wallace* 2: a shiny app for modeling species niches and distributions redesigned to facilitate expansion via module contributions. Ecography, 2023(3), e06547. https://doi.org/10.1111/ecog.06547

Galante, P.J., Chang, S., Paz, A., Aiello-Lammens, M., Gerstner, B.E., Johnson, B.A., Kass, J.M., Merow, C., Noguera-Urbano, E.A., Pinilla-Buitrago, G.E. & **Blair, M.E.** (2023). *changeRangeR*: an R package for reproducible biodiversity change metrics from species distribution estimates. Conservation Science & Practice, 5(1), e12863. https://doi.org/10.1111/csp2.12863

Gosnell, S. J., Green, D. P., Akallal, L., Wepy, C., Laghiti, G., Akter, M., Heller, N., & Ozgur, N. (2022). Finding a place for panthers: Mapping conservation issues related to Florida panthers. Network of Conservation Educators and Practitioners. Available from https://ncep.amnh.org.

Landrigan, K., Macey, S. K., Gazit, N., Douglas, K. E., & Porzecanski, A. L. (2022). Exchange for Change: Learning from Our Network to Expand Our Teaching Practice. Lessons in Conservation. American Museum of Natural History, Center for Biodiversity and Conservation, Network of Conservation Educators and Practitioners. The Network Issue. Vol. 12, Issue 1, pp 23-24. December 2022. Available from: https://www.amnh.org/research/center-for-biodiversity-conservation/resources-and-publications/lessons-in-conservation/volume-12

Pascua P., Winter, K.B., Schloemer, J., **Sterling, E.J.,** Rii, Y., Reppun, F., Harrald, I., Dacks, R., Ching, C., Bentz, S., & Argueta, J. (2022). Methods Pilot Summary: Cultural Ecosystem Services in Estuary Stewardship and Management. A report prepared with support from a 2020 NERRS Science Collaborative Catalyst Grant. October 2022. Available from: https://nerrssciencecollaborative.org/resource/methods-pilot-summary-cultural-ecosystem-services-estuary-stewardship-and-management

SEARCH, Ahkinga, O., Alexander, E., Apassingok, M.D., Baker, B., Baker, M., Berman, M., **Blair, M.** … & Justin, W. (2022). Consequences of rapid environmental Arctic change for people. Arctic Report Card 2022, pp 123-129 (M. L. Druckenmiller, T. A. Moon, & R. L. Thoman, Eds.). National Oceanic and Atmospheric Administration (NOAA), Washington, D.C. https://doi.org/10.25923/kgm2-9k50. Available at: https://arctic.noaa.gov/Report-Card/Report-Card-2022/ArtMID/8054/ArticleID/1001/Consequences-of-Rapid-Environmental-Arctic-Change-for-People

Sterling, E.J., Pascua, P., **Sigouin, A., Gazit, N., Betley, E.,** Dacks, R., Bentz, S., Argueta, J., Walker, C., Reppun, F., Rii, Y., & Winter, K. (2022). Expanding and Deepening the Application of Cultural Ecosystem Services in Estuary Stewardship and Management: Relevance to the National Estuarine Research Reserve System. A white paper prepared with support from a 2020 NERRS Science Collaborative Catalyst Grant. October 2022. Available from: https://nerrssciencecollaborative.org/resource/expanding-and-deepening-application-cultural-ecosystem-services-estuary-stewardship-and-0

Spring 2023 | Presentations, Posters, Workshops, and Short Courses

Arengo F. (2023). Environmental impacts of lithium mining in Andean wetlands. Invited panelist. Transition to Renewable Energy: Balancing Environmental Impacts of Metal Mining for Batteries session; 5th Yale Symposium on Chinese Overseas Investment: Metal Mining-Balancing Investment Impact and Sustainability. Yale University, New Haven, CT. 15 April 2023

Arengo F. (2023). Birds, brines, and batteries: flamingo conservation in Andean wetlands under pressure from mining development. Guest lecturer. Conservation in practice: an international perspective; graduate seminar. Yale University, New Haven, CT. 23 February 2023.

Arengo, F. (2023). Los humedales de altura: biodiversidad, importancia y servicios ambientales. Guest lecturer. Escuela Secundaria El Peñón (High School), Catamarca, Argentina. 24 January 2023.

Arengo F. (2022). Finding and protecting flamingos in South America. Guest scientist/speaker. Science and Nature Program, American Museum of Natural History, New York, NY. 13-14 December 2022.

Betley, E.B. (2023). Applying systems thinking to food systems, with a biocultural lens. Guest lecturer. U.S. and International Nutrition. Columbia University, New York, NY. 12 April 2023.

Betley, E., Gomez, A., **Porzecanski, A.L. & Sigouin**, A. An Evidence Synthesis to Inform the Update of USAID's 2014 Biodiversity Policy. Presentation to USAID Biodiversity Division. 22 February, 2023.

Blair, M.E. (2023). *Wallace*: un software para estimar la distribución de especies y cuantificar cambios en la biodiversidad. Invited Keynote Speaker. IV Colombian Symposium on Distribution Modeling at the VI Congreso Colombiano de Zoología, Monteria, Colombia. 30 March 2023.

Blair, M.E., Pozzi, L., Penna, A., Gaughran, S., Wallace, M., Clark, L., Salis, A. & Giakoumis, M. (2022). Applications of museum collections and phylogenomics to biodiversity conservation. Workshop (Hybrid). Student Conference on Conservation Science - New York, Center for Biodiversity and Conservation, American Museum of Natural History, NY. 3-7 October 2022.

Dobson, K.M., Carlos-Shanley, C. & **Blair, M.E.** (2022). Human Proximity Impacts on Wild *Saimiri* Gut Microbiome. Podium Presentation. Texas Association of Biological Anthropologists Annual Meeting, Austin, TX, 11-12 November 2022.

Nguyen, T.A., Le, M.D. & **Blair, M.E.** (2022). Assessment of climate change impacts on two endemic primates in Vietnam. Podium Presentation. 8th Asian Primate Symposium, Hanoi, Vietnam. 13-16 November 2022.

Noguera Urbano, E., **Blair, M.E.,** Paz, A. & López, D. (2023). Curatón: BioModelos Xenartha y Artiodactyla. Workshop. VI Congreso Colombiano de Zoología, Monteria, Colombia. 20 March 2023.

Pascua P., **Sterling, E.J.** & Dacks, R. (2022). Webinar: Cultural Ecosystem Services in Estuary Stewardship and Management. 8 September 2022. https://nerrssciencecollaborative.org/resource/cultural-ecosystem-services-estuary-stewardship-and-management

Porzecanski, A. L. & F. Arengo. (2023). Cómo ayudan los científicos a conservar el planeta? Presentation about biodiversity in Latin America, with sessions available in English and Spanish. Co-presenter with Felicity Arengo. EarthFest, American Museum of Natural History, New York, NY. 22 April 2023.

Porzecanski, A. L. (2023). New York City and the Biodiversity Crisis. Panel discussion; co-panelist with Eric Sanderson. New York Restoration Project (NYRP) "Talks" event. nyrp.org/talks. BNP Paribas, New York, NY. 19 April 2023.

Porzecanski, A. L. (2023). What does the current decline in insect biodiversity mean for cities like New York? Panel discussion; invited speaker The Spring Lunch: Science, Society and Our Environment; American Museum of Natural History, New York, NY. 18 April 2023.

Porzecanski, A. L., Betley, E., Gomez, A. & Vargas, G. (2023). Horizonte Minero
Agenda de Investigación y Aprendizaje. Presentation to USAID and Government of Colombia, by Integrated Natural Resource Management (INRM). 28 October 2022.

Porzecanski, A. L., Betley, E., Gomez, A. Evans, D. & Vargas, G. (2023). Mining Horizon Research and Learning Agenda for artisanal and small-scale gold mining in Colombia. USAID Integrated Natural Resource Management (INRM). Presentation to USAID. 27 October 2022.

Porzecanski, A. L., & Macey, S. (2022). Expanding Your Teaching Toolbox: An Introduction to Active Teaching and Scientific Teaching Approaches. Workshop. Student Conference on Conservation Science – New York, New York, NY. 7 October 7 2022.

Russell, A., **Macey, S.,** Willis, C. & Beck, C. (2023). Turning ecological research into engaging online modules for undergraduates through Gala/OCELOTS. Workshop. Ecological Society of America Life Discovery Conference. Tallahassee, FL. 24 March 2023.

Spring 2023 | Outreach and Media

Blair, M.E. Biodiversity and the Climate Crisis. Invited appearance to the Podcast Series "Talk that Walks: Leaders at the Crossroads" by the Alliance of Leadership Fellows. 29 April 2023. https://www.allianceofleadershipfellows.org/podcast/biodiversity-and-the-climate-crisis

Blair, M.E. Museum researchers describe new species of nocturnal primate. Featured Research Blog Post, American Museum of Natural History, by Snyder, K. https://www.amnh.org/explore/news-blogs/research-posts/pygmy-loris-new-species (March 13, 2023).

Porzecanski, A. L. Global Community: Protecting Our Planet. Media interview; interviewee in reporting feature that examines animal conservation efforts in Tanzania. CBS (Columbia Broadcasting System) News-New York, by Jessi Mitchell, segment 1 of 3. New York, NY. 14 April 2023.

Porzecanski, A. L. Essence 3: Nature. Lead interviewee. Women Emerging podcast. 21 March 2023. https://podcasts.apple.com/us/podcast/women-emerging-podcast/id1615753944

Porzecanski, A. L. A pause as the expedition closes & the sharing starts. Featured interviewee. Women Emerging podcast. 2 February 2023. https://podcasts.apple.com/us/podcast/women-emerging-podcast/id1615753944

Porzecanski, A. L. Forbes. Women Emerging Expedition Sets Out to Explore Approaches to Leadership that Resonate with Women. Media interview; featured interviewee on Forbes.com with contributor Marianne Schnall. 18 November 2022. Article and audio: https://www.forbes.com/sites/marianneschnall/2022/11/18/women-emerging-expedition-sets-out-to-explore-approaches-to-leadership-that-resonate-with-women/?sh=3603ddda5521

Porzecanski, A. L. Protecting the Biodiverse Fabric of Nature; A Dialogue. Interview, Stanford Millennium Alliance for Humanity and the Biosphere (MAHB) Dialogue Series. 17 November 2022. https://mahb.stanford.edu/blog/mahbdialogues/protecting-the-biodiverse-fabric-of-nature-a-mahb-dialogue-with-ana-luz-porzecanski-american-museum-of-natural-history/

Porzecanski, A. L. What is the role of Language within Leadership? Featured interviewee. Women Emerging podcast. 20 December 2022. https://podcasts.apple.com/us/podcast/women-emerging-podcast/id1615753944